

REMARKS

Claims 1, 3, 4, 30 and 31 remain pending in the present application. Claims 2 and 5-29 have been cancelled. Claim 1 has been amended. Claims 30 and 31 are new. Basis for the amendments and new claims can be found throughout the specification, claims and drawings originally filed.

JP 2003-015327

The JP '327 application has been granted in Japan as Japanese Patent (Publication) No. 3956854. Enclosed is an English translation of the published claims in which Claim 1 is a combination of original Claims 1 and 2 and Claims 2-5 correspond to original Claims 3-6.

REJECTION UNDER 35 U.S.C. § 112

Claims 1-6 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. The claims have been amended to overcome the rejections. Reconsideration of the rejection is respectfully requested.

REJECTION UNDER 35 U.S.C. § 102 / § 103

Claims 1-4 are rejected under 35 U.S.C. § 102(b) as being anticipated by JP 2002-286382. Claim 5 is rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 2002-286382 as applied to Claim 4 above, and further in view of JP 2001-339027. Claim 6 is rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 2002-

286382 as applied to Claim 4 above, and further in view of JP 2002-164490. Applicants respectfully traverse this rejection. Claim 1 has been amended to include the limitations of Claims 2, 5 and 6 as well as the limitation that the second space is formed with a plurality of second apertures formed in the intermediate plates; and the first space is formed by communicating the plurality of first apertures with one another and the second space is formed by communicating the plurality of second apertures with one another. Support for this limitation is provided on page 22, line 11 to page 23, line 6.

JP 2002-286382 (USP 6,810,947) discloses a cooling device which includes a space in which the refrigerant circulates and a space where air flows but does not include a hermetically sealed first space and a sealed second space as amended Claim 1 of the present invention defines. In addition, JP 2001-339027 and the JP 2002-164490 references do not disclose the two sealed spaces.

References JP '382, JP '027 and JP '490 do not disclose a construction in which a part of a heat-generating member contacts refrigerant flow paths or cooling water flow paths. In the present invention, a heat-generating member, such as a semiconductor device, which is attached to a lower plate contacts a first space and a heat-generating member, such as a semiconductor device, which is attached to an upper plate contacts a second space, so that the heat-generating member attached to a lower plate can be cooled by evaporating refrigerant and a heat-generating member attached to an upper plate can be cooled by cooling water. The above configuration of the present invention is different from that of references.

Thus, Applicants believe Claim 1, as amended, patentably distinguishes over the art of record. Likewise, Claims 3 and 4, which depend from Claim 1, are also believed

to patentably distinguish over the art of record. Reconsideration of the rejection is respectfully requested.

NEW CLAIMS

New Claims 30 and 31 are dependent claims that further define the relationship between the heat generating members and the flow passages.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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MJS/pmg



1. A cooling apparatus boiling and condensing a refrigerant, comprising:

an upper plate;

a lower plate;

a plurality of intermediate plates stacked between said upper plate and said lower plate;

a first space defined by a plurality of apertures formed in said intermediate plates for hermetically sealing a refrigerant therein;

a second space through which an external cooling fluid flows in proximity to said first space; and

at least a heat-generating member mounted on an outer surface of at least said lower plate of said upper plate and said lower plate;

wherein heat is exchanged between said external cooling fluid and said refrigerant boiled by the heat of said heat-generating member;

wherein an upper surface of said second space is formed in proximity to an inner surface of said upper plate; and

wherein an area where said upper surface of said second space is in proximity to said inner surface of said upper plate is formed in a position corresponding to the area of said heat-generating member which may be mounted on said upper plate.

2. A cooling apparatus boiling and condensing a refrigerant according to claim 1,

wherein a lower surface of said second space is formed in proximity to an inner surface of said lower plate.

3. A cooling apparatus boiling and condensing a refrigerant according to claim 1 or 2,

wherein said first space includes a plurality of first small spaces communicating with each other;

wherein said second space includes a plurality

of second small spaces communicating with each other; and

wherein said first small spaces and said second small spaces are arranged to coexist with each other.

4. A cooling apparatus boiling and condensing a refrigerant according to claim 3,

wherein said heat-generating member includes a plurality of internal heat sources generating heat, and

wherein said heat sources of said heat-generating member mounted on said lower plate are arranged in positions corresponding to the positions of said first small spaces.

5. A cooling apparatus boiling and condensing a refrigerant according to claim 3 or 4,

wherein said heat-generating member includes a plurality of internal heat sources, and

wherein said heat sources of said heat-generating member mounted on said upper plate are arranged in positions corresponding to the positions of said second small spaces.